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Cover Page Footnote

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Cooperative Extension Nutrition Education Program: Outreach to Southeast Kentucky Families in Poverty

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The University of Kentucky Cooperative Extension Service provides community engagement and outreach efforts for Kentucky families living in poverty as part of the land grant mission. Food security is a primary concern for those with limited resources and income. To address food availability and nutrition concerns of these families, Cooperative Extension delivers researched-based educational programming through the Expanded Food and Nutrition Education Program (EFNEP). EFNEP is a federally funded program that works to improve the quality of life of families living in poverty through education and behavior modification. The EFNEP program uses a community-based outreach approach where food and nutrition educational content is taught by peer educators to provide experientially-based programming on making quality food choices. In this article, the authors look at the characteristics of a high poverty, Appalachian region of Kentucky and the impact of the EFNEP program outreach to local families as compared to state and national impact data.

Key Words: Food Security, Cooperative Extension, Appalachia, Poverty

Appalachia is a multi-state region that follows the Appalachian Mountains from New York to Mississippi, is largely rural, and includes the eastern portion of Kentucky (Smith, Valenzuela, & Ludke, 2012). For many Appalachian families, poverty and hunger are primary concerns. Poverty is defined as a minimum amount of money needed to support an individual or family starting at \$11,344 for a single individual under the age of 65 (National Poverty Center, n.d.). According to 2010 census data (as cited by the National Poverty Center, n.d.), 15.1% of all persons in the United States are considered impoverished. Kentucky has one of highest poverty rates in the nation, with an estimated 19% of people living below poverty guidelines (United States Census Bureau, n.d.). More specifically, the eastern Kentucky counties that comprise the state's Appalachian region have an average of 25.7% of people in poverty (United States Census Bureau, n.d.).

Ensuring adequate and healthy nutritional intake for families in Kentucky's impoverished communities can be a challenge. Limited health information can result in unhealthy dietary habits and limited physical activity (Smith et al., 2012). Individuals in these areas often have difficulty finding affordable healthy food options and making healthy food decisions (Rudd Center for Food Policy and Obesity, 2008). A scarcity of community support systems for families to access healthy foods contributes to these challenges. Low-income communities may benefit from resources and infrastructure defined by local needs and implemented through local residents to develop supportive environments for healthy lifestyle choices (Kennedy et al., 2011).

The work of Smith et al. (2012) on community based participatory research in Appalachian regions identified the need for internally based solutions to have meaningful, long term impact on health and healthy lifestyles. Educational efforts implemented through the university system should include sharing of information and learning to demonstrate

the most effectiveness. Regional Appalachian educational initiatives, as explored by Sweet, Carpenter, and Blythe (2012) found this community based approach could be effective in addressing issues such as poor health.

More than 100 land-grant universities across the United States engage in an integration of research, teaching and Cooperative Extension missions. Extension outreach employs a community-based framework that serves as a catalyst for local improvements in the community. Through the Extension mandate mission, universities are tasked to share “their resources, solving public needs with college or university resources through non-formal, non-credit programs” (United States Department of Agriculture, National Institute of Food and Agriculture, 2011, “Extension,” para. 1). The focus of the outreach varies from state to state and is implemented through the efforts of local Extension offices and personnel. Educational programming efforts initiated through Extension are driven by community needs at the local level (United States Department of Agriculture, National Institute of Food and Agriculture, 2011) and guided by research-based models of community engagement such as diffusion of innovation, social ecological, community based participatory research and translational research (National Institutes of Health, 2011).

Engagement literature points to the importance of community context and multi-level approaches to effect sustainable behavior change (Stokols, 1996; Jakes & Brookins, 2004). The social ecological model acknowledges the importance of individual, interpersonal, community and policy influences on behavior choices (National Institutes of Health, 2011). Extension outreach programs that are grounded in a social ecological model include strategies that acknowledge and leverage the multiple dimensions of family and community systems that effect behavior choices (DeBord, Jakes, & Guin, 2010; Hardison-Moody, Dunn, Jones, Newkirk & Thomas, 2011). The University of Kentucky Cooperative Extension Service conducts community engagement and outreach efforts from a social ecological model for specific vulnerable populations in Kentucky, including, families living in poverty.

Food security is a primary concern for families living in poverty. To address food availability and the nutrition concerns of these families, Cooperative Extension delivers researched-based educational programming through the Expanded Food and Nutrition Education Program (EFNEP). EFNEP is a federally funded program that works to improve the health of low-income families through education and lifestyle changes (United States Department of Agriculture Cooperative State Research, Education, and Extension Service, 2009).

EFNEP uses a community based outreach approach where educational content is delivered by paraprofessionals (peer educators) who live in communities in which they work to provide experientially-based programming on making quality food choices. The county based Extension staff work from a social ecological model to effect health behavior change at individual, interpersonal, community and policy levels. Educational programs are designed to reach individuals and families through the context of their everyday lives. Community organizations and systems are engaged to address local accessibility and affordability of healthy food choices. Community stakeholders are educated and involved in policy development to support those at risk for food insecurity. In this article, the authors look at the social ecological aspects of a high poverty, Appalachian region of Kentucky and the impact of EFNEP as an outreach activity of the University of Kentucky.

Review of Literature

Appalachian families have historically been faced with social problems related to persistent poverty. Stokols (1996) found that within local social ecological contexts there are pivotal influencers of health and well-being. In Appalachia, these influencers range from high rates of drug abuse (Thornton & Deitz-Allyn, 2010), high prevalence of chronic disease (Barker et al., 2010), and high rates of unemployment (Appalachian Regional Commission, 2011). Families often struggle to make wise health choices in this impoverished climate. Particularly difficult for many families are healthy food choices. Serrano, Leiferman, and Dauber (2007) found that rural Appalachian families are less likely to choose low-calorie nutrient rich foods such as fruits and vegetables. The long-term consequences of poor food choices has resulted in eastern Kentucky, northern Tennessee and West Virginia (which comprise the central Appalachia region of the United States) reporting the highest rates of obesity and diabetes in the United States (Gregg et al., 2007).

Multiple and confounding factors contribute to the poor health choices made by rural, low-income families. Particularly in the Appalachian areas, social and environmental support systems are inadequate to simplify access, assure affordability, and promote action for good nutritious food selection and preparation (Blanchard & Lyson, 2006; Coyne, Demian-Popescu, & Friend, 2006). Studies of access to healthy foods in economically challenged communities found fewer supermarkets and nutritious foods to buy (Rudd Center, 2008). In rural communities, very few poverty-stricken families eat the recommended servings of fruits and vegetables in their daily diet (Kaiser, Brown, & Baumann, 2010). In a study of food security and dietary habits on adolescent obesity in Appalachia, Williams, Taylor, Wolf, Lawson and Crespo (2007) found that grocery store costs were high while food selection and space were limited. Parents in the study stated that lack of time and high travel costs prohibited them from purchasing nutritious foods at stores with better selection and more reasonable prices. With these issues many of the families relied on fast foods to fill the void with less expensive, quick meals.

Farmers markets offer alternative access to seasonal produce; however, in Appalachia the steep terrain and small agricultural operations are limiting factors to large scale production (LaLone, 2008). These challenges decrease the potential to expand local access through focused efforts in local communities. Holben, McClincy, Holcomb, Dean and Walker (2004) found that Appalachian adult participants indicated the lack of agriculture production and gardening in their community as a contributing factor to poor health choices and hunger.

Lack of nutrition and food preparation knowledge is another challenge faced by low-income families in all geographic areas. Low educational levels in Appalachia can compound the lack of nutrition literacy by impacting multiple generations. Bradbard, Michaels, Fleming, and Campbell (1997) found that women in low income households had limited knowledge of basic food preparation for nutritious family meal-planning. This lack of skill was evidenced in their decisions to prepare high-fat meals based on the known taste choices of their children rather than their nutritional needs.

The social ecological challenges faced by Appalachian families can be diminished by multi-faceted community engagement to develop healthy lifestyle choices. Kaiser et al. (2010) found a positive correlation between local community and family support and healthy nutrition choices. Programs that teach low-income families to raise, purchase, store, prepare and preserve fresh fruits and vegetables have been shown to be effective

in increasing consumption of nutritious foods (Brink & Sobal, 1994; Flanigan & Varma, 2006; Greenwell-Arnold & Sobal, 2000; Koszewski, Sehi, Behrends, & Tuttle, 2011).

The United States Department of Agriculture (USDA) Nutrition Education programs are one example of community based outreach designed to support access, affordability, and healthy eating choices through family education in economically challenged neighborhoods. Since 1969 EFNEP has been administered through the Cooperative Extension System in all 50 states (Koszewski et al., 2011). Nutrition paraprofessionals within the community teach good nutrition practices, food safety, and food budgeting through a series of lessons based upon the specific needs of the enrolled families. After completing the core nutrition education classes and demonstrating practice and knowledge changes, participants complete an extensive exit program evaluation, and are finished with program participation. Participants who complete the program are considered EFNEP graduates. Program success is measured through self-reported food recalls at three points within the program, behavior checklist assessment tools, and garden surveys (United States Department of Agriculture, 2011). Several studies have pointed to the effectiveness of the EFNEP model in positively impacting healthy food choices from beginning of program to graduation (Cason, Scholl, & Kassab, 2002; Dollahite, Olson, & Scott-Pierce, 2003; Greenwell-Arnold & Sobal, 2000). Further, follow-up studies of program graduates within one year found a continuation of healthy behaviors that started during EFNEP; such as, decreased fat intake, improved food budgeting skills and attention to good food safety practices (Brink & Sobal, 1994; Greenwell-Arnold & Sobal, 2000).

This article examines EFNEP outcomes within the context of the Appalachian culture and socioeconomic environment to determine if program success holds given the extraordinary barriers to accessing nutritious foods in the regional area to determine if the University's outreach efforts are being achieved. The regional findings will also be compared with state and national data to determine any differences in program outcomes.

Method

Background and Procedures

Community outreach of the Kentucky Cooperative Extension Service is executed by county-based educational programs which address the needs of Kentuckians through research-based education (University of Kentucky College of Agriculture, 2011a). Kentucky EFNEP is a critical part of the Extension mission to address the food and nutrition education needs of families living in poverty. There are 120 county Extension programs in Kentucky, each with unique program focus based on community priorities. Due to the individualized nature of Extension programs, EFNEP is not found in every county; however, 61 counties with a significant need for engaging families living in poverty have EFNEP paraprofessionals in place.

The goal of EFNEP is to educate limited resource families by providing the knowledge, skills, and change behaviors that are necessary to achieve health and wellbeing (University of Kentucky College of Agriculture, Cooperative Extension Service, n.d.a). As a result of participation, families are expected to improve their health and wellness, improve their diet quality, and reduce hunger. EFNEP targets limited resource families with children and youth up to age 18 for participation (University of Kentucky College of Agriculture, Cooperative Extension Service, n.d.b). Limited resource families are defined as those families without adequate income to provide needed food and/or goods or services. EFNEP also recruits

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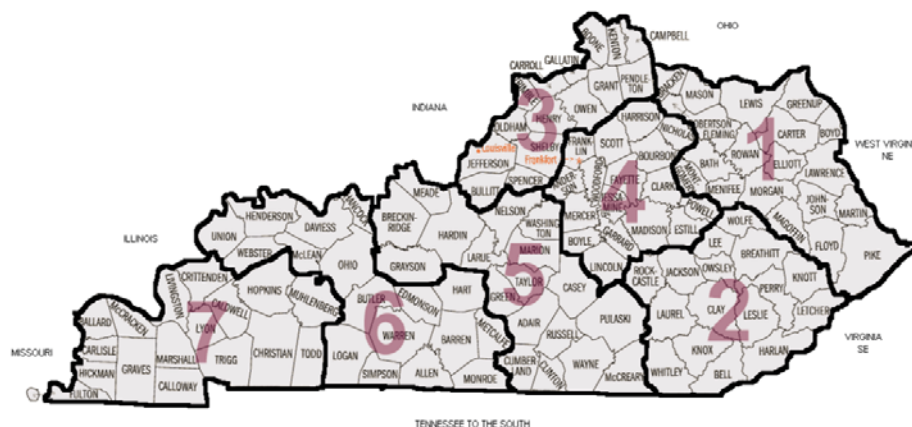
families eligible for USDA food assistance programs and those receiving public assistance.

EFNEP is a component of the overall county Extension program in Kentucky communities (University of Kentucky College of Agriculture, Cooperative Extension Service, n.d.b). Under the supervision of county Extension Agents, trained paraprofessionals manage the educational and evaluation components of EFNEP. Paraprofessionals deliver programs to limited resource audiences in group settings or individual education. While EFNEP provides standardized curriculum for statewide use by paraprofessionals, the implementation of the program at the community level varies based on the grassroots needs of the county. At a minimum, EFNEP paraprofessionals are required to have 6 hours of instruction time with program families. Educational sessions may utilize any available EFNEP curriculum; however, specific lessons are individualized for each family to address the unique needs of the family's diet and nutritional intake. EFNEP functions on an open enrollment system. Families may join the program at any time and will be involved in the educational program for up to a year after their entry.

Figure 1

Map of Extension District System in Kentucky

(University of Kentucky College of Agriculture, Cooperative Extension Service, 2010)



The Kentucky Cooperative Extension Service organizes counties by geographic proximity and regional similarities into Extension districts (University of Kentucky College of Agriculture, Cooperative Extension Service, 2012). District 2 in the Kentucky Cooperative Extension Service system accounts for the southeastern Appalachian region of Kentucky (see Figure 1). There are 16 county Extension programs in district 2. Eleven of these counties have EFNEP paraprofessionals. Because of the high percentage of counties with EFNEP, district 2 was selected to examine the impact of nutrition education outreach efforts in Appalachia by analyzing the program's evaluations.

Southeastern Kentucky is physically, a rural and mountainous area. According to the 2010 Census, district 2 has a population of 351,380 and accounts for approximately 8% of the Kentucky population (United States Census Bureau, 2010a). Compared to the state and national populations, district 2 is much less diverse. The population has a lower median income compared to state and national income levels. Overall, the state and national education completion rates are superior to district 2. Poverty rates in the district are

disproportionately high compared to state and national averages for the overall population and for child poverty. Furthermore, governmental services including food stamps and public assistance for families are utilized disproportionately higher in southeastern Kentucky compared to state averages. See Table 1, for detailed information regarding the demographics of the population of district 2, Kentucky, and the United States. The 2010 United States census data illustrates the social ecological conditions of the Appalachian region of district 2. The EFNEP program directly serves the limited resource clients faced with persistent poverty in district 2 to address the food security issues of families.

Table 1
Demographic Characteristics of the Population

	United States	Kentucky	District 2
Number	308,745,538	4,339,367	351,380
Race/Ethnicity			
White	79%	89%	97%
Black	13%	8%	1%
American Indian	1%	0.3%	0.2%
Asian	5%	1%	0.3%
Hispanic	17%	3%	0.8%
Median Income	\$52,762	\$40,089	\$28,432
Education Level			
Less than High School	15%	19%	33%
High School	57%	61%	56%
Bachelor's Degree or Higher	28%	20%	11%
Total Poverty	15%	19%	29%
Child Poverty	22%	26%	39%
Food Stamp Benefits	Not Available	19%	33%
Public Assistance	Not Available	1%	2%

Note. Percentages may not equal 100% due to rounding.

Participants

Program data from the 2010-2011 year captures the participation of EFNEP families. Across the United States, there were 134,336 adults enrolled in EFNEP, reaching 378,862 family members (includes Kentucky and district two data) (United States Department of Agriculture National Institute of Food and Agriculture, 2011). In Kentucky, there were 4,462 participating EFNEP families enrolled (includes district two participants) (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011). There were 1,505 program families enrolled in district two EFNEP, reaching 4,629 adults and youth. Those participants completing the program and providing exit evaluations were assessed for dietary behavior changes and comprise the sample of this study. There were 87,585 ENFEP graduates in the United States (United States Department of Agriculture National Institute of Food and Agriculture, 2011), 1,955 graduates in Kentucky, and 714 graduates in district two (University of Kentucky College of Agriculture, Cooperative Extension

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Service, 2011). Table 2 highlights the demographic information for EFNEP participants at national, state, and district levels.

Table 2
Demographic Characteristics of the Sample

	United States	Kentucky	District 2
Number	87,585	1,955	714
Race/Ethnicity			
White	53%	89%	98%
Black	2%	7%	1%
American Indian	2%	0%	0%
Asian	2%	0%	0%
Native Hawaiian or Pacific	2%	0%	0%
Multiple Race	3%	0%	0%
Unknown	7%	3%	0%
Hispanic	28%	4%	0%
Sex			
Male	50%	90%	93%
Female	50%	10%	7%
Food Assistance	77%	71%	66%

Note. Percentages may not equal 100% due to rounding.

EFNEP in the United States represents a diverse range of races (United States Department of Agriculture National Institute of Food and Agriculture, 2011); however, families in Kentucky EFNEP and district 2 EFNEP are primarily Caucasian, with a small number of minorities (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011). Overall, EFNEP participation in the United States is equally distributed between sexes

(United States Department of Agriculture National Institute of Food and Agriculture, 2011). However, in Kentucky, and district two, females disproportionately comprise the EFNEP participants (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011). At the national, state, and district level, compared to the general population there is substantial proportion of EFNEP participants receiving food stamp benefits; however, the nature of the EFNEP program is to target individuals receiving those benefits thus accounting for these higher percentages.

Study Design

The purpose of this study is to report the impact of EFNEP outreach efforts to families living in poverty in the Appalachian region of southeast Kentucky and compare results to state and national impact data to determine if the barriers of living in Appalachia prevent a healthy dietary pattern from emerging with this population as a way to determine the regional impact of this University of Kentucky program. Internal secondary data sources, in the form of the 2011 EFNEP evaluation report, were obtained and compared to Extension district, state, and national evaluation reports from the same year. The 2011 impact data

were collected during the reporting period of July 1, 2010 through June 30, 2011 by paraprofessional educators who were conducting the EFNEP program. From comparison of multi-level data, conclusions were drawn regarding the impact and effectiveness of specific nutrition education program as implemented in a clearly defined Appalachian region in Kentucky. The secondary data report was selected as a source of analysis for its program outcomes, the extensive evaluation conducted, and the program's widespread implementation in the Appalachian region.

Upon enrollment in EFNEP, participating families participate in ongoing evaluation throughout the education process to determine progress toward intended program outcomes (University of Kentucky College of Agriculture, Cooperative Extension Service, n.d.a). EFNEP utilizes the USDA's Economic Research Service evaluation program, Nutrition Education Evaluation and Reporting System (NEERS) to document the program's participation and impact on food related decision making (University of Kentucky College of Agriculture, Cooperative Extension Service, n.d.c). EFNEP paraprofessionals maintain family files which include accountability and education evaluation information. This consists of dietary records obtained at the beginning, midpoint, and completion of the program. Documentation measuring food behaviors and dietary intake practice changes are also collected to analyze eating behaviors.

Self-reported data are collected by the paraprofessional based on personal interviews with family participants. The family is asked to recall and disclose dietary habits and behavior practices on a variety of food consumption and nutrition related indicators by asking the participant to start at the last meal consumed and think back over the last 24-hours and describe what was eaten and the quantity of food consumed. Visual cues including food models and measuring cups are available to assist participants in estimating the amounts of food consumed during this period of time.

The same evaluation protocol is followed at the entry and exit points of the program with the data entered into the NEERS system for calculated dietary consumption patterns. The data are collected and compiled at the county level. This county level impact information is then aggregated at the Extension district, state, and national level. Using the reports of the dietary recalls, examination of the food group consumption was studied to determine improvements in food consumption that represents the foundation for healthy eating behaviors that may be an outcome of completion of EFNEP at various levels of the program.

The secondary data analysis for this study was approved by the University of Kentucky Institutional Review Board.

Results

Kentucky EFNEP provides a summary report of dietary improvement which is the information source for this article. Families are targeted for eating a healthy dietary pattern consisting of 6 ounces of grains, 2.5 cups of vegetables, 2 cups of fruit, 5.5 ounces of meat or beans, and 3 cups of milk daily (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011a). During the program reporting year, there were 87,585 national entry and exit recall evaluations reported for EFNEP adults (United States Department of Agriculture National Institute of Food and Agriculture, 2011). Based on those completing the program, 94.2% reported a positive change in one or more food groups by program graduation. In Kentucky, 1,955 families completed the EFNEP program and provided entry and exit recalls (University of Kentucky College of Agriculture, Cooperative

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Extension Service, 2011a). Participants reported a 98.7% positive change in one or more food group at the completion of the program. District two reported 714 families completing the program with entry and exit recalls. Of those finishing the program, 99.2% had a positive change in one or more food group.

Dietary patterns for families enrolled in EFNEP show improvement in all food group categories at most levels of participation (United States Department of Agriculture National Institute of Food and Agriculture, 2011; University of Kentucky College of Agriculture, Cooperative Extension Service, 2011a). A series of repeated measures t tests were conducted using SSISA: Simple Interactive Statistical Analysis software (1997) to test the statistical significance of differences in the reported dietary behaviors of the EFNEP program participants at the national, state, and district levels.

Table 3
Program Results in Dietary Change by Food Group

Consumption by Food Group	Mean Entry	Mean Exit	Mean Change	t-value
Grains				
(6 oz. recommended/day)				
United States	5.6	5.5	-0.1	-5.28*
Kentucky	6.8	7.1	0.3	1.67*
District 2	6.5	7.3	0.8	3.11*
Vegetables				
(2.5 cups recommended/day)				
United States	1.4	1.7	0.3	40.43*
Kentucky	1.7	2.3	0.6	5.75*
District 2	1.6	2.7	1.1	12.89*
Fruit				
(2 cups recommended/day)				
United States	0.9	1.3	0.4	59.63*
Kentucky	0.5	1.4	0.9	22.74*
District 2	0.5	1.7	1.2	17.06*
Meat or Beans				
(5.5 ounces recommended/day)				
United States	4.9	5.0	0.1	40.48*
Kentucky	0.5	1.4	0.9	22.74*
District 2	4.8	5.7	0.9	5.52*
Milk				
(3 cups recommended/day)				
United States	1.2	1.5	0.3	43.27*
Kentucky	1.3	2.1	0.8	17.32*
District 2	1.3	2.5	1.2	16.19*

Note. * indicates statistical significance $p < .05$

Daily USDA recommendations for grain are 6 ounces. Table 3 illustrates data findings

in entry and exit dietary grain intake at national, state, and district levels. National data indicates a statistically significant, $t(87,584) = -5.28$, decrease in consumption of grains at the exit of the program $M = -0.1$, $SD = 7.85$ (United States Department of Agriculture National Institute of Food and Agriculture, 2011). Grain consumption patterns at the state level increased by 0.3 ounces ($SD = 11.17$). This difference was statistically significant, $t(1,954) = 1.67$, $p < .05$. At the district level, grain consumption increased by 0.8 ounces ($SD = 9.65$) which was also statistically significant, $t(713) = 3.11$, $p < .05$.

For the vegetable group, 2.5 cups are recommended each day. Table 3 summarizes data findings for changed eating behaviors in the vegetable group. The national results show a positive change of 0.3 cups ($SD = 3.09$) of vegetables consumed by participants (United States Department of Agriculture National Institute of Food and Agriculture, 2011). This change was a statistically significant difference, $t(87,584) = 40.482$, $p < .05$. Kentucky results indicate that at exit, participants increased vegetable consumption, $M = 0.6$, $SD = 5.8$ (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011a), which was a statistically significant difference $t(1,954) = 5.75$, $p < .05$. District two demonstrated an overall improvement of 1.1 cups ($SD = 3.12$) of vegetable consumption in the sample population which was a statistically significant finding $t(713) = 12.89$, $p < .05$.

Dietary recommendations call for 2 cups of fruit daily. Table 3 summarizes data findings. National results indicate that EFNEP program participants exited the program improving fruit consumption, $M = 0.5$ cups ($SD = 2.77$) (United States Department of Agriculture National Institute of Food and Agriculture, 2011). This was a statistically significant difference, $t(87,584) = 59.63$, $p < .05$. Kentucky participants show improvement with an increased consumption of 0.9 cups of fruit ($SD = 2.23$) (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011a), which was a statistically significant difference, $t(1,954) = 22.74$, $p < .05$. District two program participants exited the program consuming an increased consumption of 1.2 cups ($SD = 2.23$). This finding was statistically significant, $t(713) = 17.06$, $p < .05$.

It is recommended that Americans consume 5.5 ounces of meats or beans daily. Table 3 summarizes data findings. National data demonstrates an increased consumption of 0.1 ounce ($SD = 8.43$) (United States Department of Agriculture National Institute of Food and Agriculture, 2011), which was a statistically significant difference, $t(87,584) = 40.482$, $p < .05$. Kentucky data indicates an exit consumption of 5.3 ounces ($SD = 6.11$) (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011a). This dietary change was a statistically significant difference, $t(1,954) = 7.02$, $p < .05$. District two participant's consumption of meat and protein increased by consumption of an additional 0.9 ounces ($SD = 6.09$). This finding was statistically significant, $t(713) = 5.52$, $p < .05$.

The USDA suggests consuming 3 cups of milk daily. Table 3 summarizes this data. National EFNEP results indicate participants consumed an increase of 0.3 cups ($SD = 2.89$) at the exit of the program (United States Department of Agriculture National Institute of Food and Agriculture, 2011), which was a statistically significant difference, $t(87,584) = 43.27$, $p < .05$. Kentucky participants increased their dairy consumption by 0.8 cups ($SD = 2.89$) (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011a). This dietary change was a statistically significant difference, $t(1,954) = 17.32$, $p < .05$. In district two, milk consumption increased by 1.2 cups ($SD = 2.79$) which was statistically significant, $t(713) = 16.19$, $p < .05$.

Discussion

For EFNEP participants at the national, state, and district levels, patterns of healthy eating improved as demonstrated by consuming food recommendations more closely aligned with the dietary guidelines for all food groups (except for a small decrease in grain consumption at the national level). EFNEP participants expanded their dietary intake to represent greater variety in the basic food groups.

In a few instances, consumption increased beyond the recommended daily allowance for grains and meat and beans groups. For both the state of Kentucky and district two, EFNEP participants are exceeding the daily recommendation for grains at both the entry and exit of the program. The daily recommendation for grains is 6 ounces each day. Kentucky participants entered the program eating 6.8 ounces and exiting the program eating 7.1 ounces. The exit consumption patterns are close to one serving more than the daily recommended amount. For district two, the meat and beans group is slightly more than the daily recommendation at the exit recall; however, individuals completing the program are meeting the daily recommendation at a serving size closer to the daily recommendation than at entry point. Additionally, these numerical results do not factor in the quality of food being consumed, such as an increased quantity of lower quality proteins or grains versus an increased quantity of nutritionally poor food.

District two shows improvement in dietary consumption of food groups from the beginning of the program to exit; particularly in the fruits, vegetables and milk groups. Consumption patterns increased to align more closely to the daily recommended servings. Although statistically significant improvements were made in all food groups, the increase in daily consumption of fruits, vegetables, and milk for the identified Appalachian counties in Extension district two exceeds the increases seen at the state and national levels. In the vegetable group, district 2 participants increased vegetable consumption by 69%, compared to the state consumption increase of 35% and national rate of 21%. Fruit consumption showed the most substantial improvement. District two consumed 240% more fruit after participation in EFNEP; whereas, Kentucky participants consumed 180% and national participants consumed 44% more fruit. In the milk group, district 2 participants increased milk consumption by 92% as compared to the state consumption increase of 62% and national consumption increased by 25%. These findings are particularly interesting as it contradicts the current literature suggesting that those living in Appalachia are less likely to consume fruits and vegetables.

Holben et. al. (2004) posit that a lack of garden production and lack of transportation are limiting factors to healthy food choices in Appalachia. In the EFNEP reporting system, participants are also asked to disclose any food crops grown and preserved at home using the Kentucky Garden Survey. An examination of the survey report finds a number of families cultivate fruits and vegetables which may aid in including additional produce in the family diet. In Kentucky, 344 EFNEP families produced a standard garden or container garden to provide fresh fruits and vegetables for their family members (University of Kentucky College of Agriculture, Cooperative Extension Service, 2011b). Of those families, 299 families canned 16,017 pint or quart jars of fruit and vegetable products, and, froze 9,440 pints or quarts of fruit and vegetable products. EFNEP families also dehydrated 249 bushels of fruits and vegetables. The harvest and preservation of these foods may aid in having a variety of fruits and vegetables for the family year-round. Further, of the 16 counties in district two, 10 counties have farmers markets which aid residents in accessing locally

grown produce. This may supplement fruit and vegetable availability in local communities during the growing season (Kentucky Department of Agriculture, 2012).

As research has demonstrated, lack of education regarding nutrition and food preparation in low income families contributes to poorer food quality and less nutritious meal planning (Bradbard et al., 1997). Participation in EFNEP documents the development of the knowledge, skills, and behavior changes to provide a more nutritious and varied dietary intake, representing movement toward healthier eating patterns for limited resource families. This education occurs within the context of a community support system. EFNEP fosters regional engagement by using trained paraprofessionals who reside within the communities they serve. Paraprofessionals serve in multiple roles. First, they are presenters of the educational material in a manner that is situated within the community and clients they serve. Second, they serve as relatable models of the nutrition education they provide.

The data evaluated here are secondary program evaluation data and are not collected as a research driven study; therefore, limitations are unavoidable. For the future, approaching these data from a longitudinal approach would provide for a long-term understanding of eating behavior changes. Also, future research is needed to explore the impact of program participation on the family's diet from a life course perspective to understand maintenance of healthy eating behaviors over time within the context of the socio ecological approach. Approaching this issue from a more holistic viewpoint of the life course allows a better understanding of patterns as they develop temporally, socially and historically (Devine, 2005; Wethington, 2005).

To better understand EFNEP's impact on the region, a long-term program analysis of evaluation results would be of benefit. Such an analysis may determine how UK outreach and community engagement efforts are fulfilling their established land-grant mission. The evaluation results should be compared from region to region in Kentucky to ascertain if the benefits of this program are seen in more urban areas or in areas that are more economically prosperous. The use of paraprofessionals who are intimately familiar with the local people and community makes this ideal for reaching traditionally underserved populations, such as those in the Appalachian region.

In summary, the purpose of this study was to assess program impacts of the Expanded Food and Nutrition Education Program as a regional engagement activity to evaluate the success of the University of Kentucky's success in addressing the needs of Kentucky families living in poverty. Although future research is required to gain a more complete understanding of the impacts of EFNEP and the overall diet quality of families living in poverty in southeast Kentucky, this descriptive analysis of the data provides an introduction to understanding the implications of appropriate outreach intervention strategies in the Appalachian region.

Culturally and geographically speaking, the Appalachian region of Kentucky that was examined in this study presents unique opportunities and challenges that make them distinct from other Kentucky regions. Using paraprofessionals from this region to provide the educational content aids in the relay and acceptance of the information. EFNEP paraprofessionals have a familiarity with the program, the people, and the geography that is essential to provide research based information about nutrition in an accessible and culturally accessible manner. Paraprofessionals are intimately aware with the community strengths and limitations that influence healthy eating options and food accessibility. EFNEP paraprofessionals work with program participants to inform and aid the decision-

making processes of clientele. This approach better serves those in geographically or culturally distinct regions by making information available in a relatable manner. This approach is a strength of the program which enhances its affectivity of the University of Kentucky Cooperative Extension Service to provide regional engagement in remote underserved areas of the state.

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